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First results of a new ocean tide loading model by data assimilation in the nearby of Iberian Peninsula

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The aim of this study is to develop a new ocean tide model, through data assimilation, for the region of the Iberian Peninsula in order to obtain more accurate ocean tide loading computations. The model domain covers the surrounding area of the Iberian Peninsula and is comprised between 34ºN-48ºN and 16ºE-6ºW, including Balear archipelago. The grid spacing is 5 minutes in longitude and latitude, which give some 9*km* resolution. The ocean tide model has been developed by assimilating satellite altimetry data together with coastal tide gauges data and deep pressure sensor measurements into a hydrodynamical model, which is based in the two dimensional barotropic depth averaged shallow water equations. Special attention was paid to followings items: (i) refinement of the grid, based on the GEBCO Digital Atlas, (ii) reliable open boundary conditions over deep or shallow waters, (iii) bottom friction varying spatially, with specific drag coefficient for the region, and (iv) an additional tidal dissipation term incorporating the effect of subgrid scale variation of bottom topography. More than 80 *in situ* stations have been combined with altimetry measurements for assimilating in the numerical model. This assimilation technique is based on the Representer Method to solve generalized inverse problems.

The Iberian Peninsula shows a great variety of coasts, surrounded by three different seas: the Cantabric Sea, the North Atlantic Ocean and the Mediterranean Sea. Ocean tides in the region are dominated by semidiurnal wave M2, with amplitudes ranging from 1.6m in the northern continental shelf of the Bay of Biscay, 1m over the Portuguese coast and decreasing until reach only a few centimetres in the Mediterranean Sea. Even far from the coast, the ocean tides cause gravity loading changes in the Iberian Peninsula of more than 4-5μgal (up to 10μgal in some locations) in amplitude

for M2 wave, which is about 10 percent of the body tide signal. The theoretical gravity changes due to ocean tide loading are computed by convolving the Green's functions with the regional model for the Iberian Peninsula developed, supplementing the most recent global ocean tide models FES2004, TPXO7.0, GOT00.2 (with 0.125, 0.25 and 0.5 degree resolution, respectively). To test the new ocean tide model for the Iberian Peninsula region, we use tidal gravity observations from the Spanish Tidal Gravity Network of the Institute of Astronomy and Geodesy of Madrid and, also, results from the ICET data bank for stations located in Portugal and France. The test is carried out by comparing the tidal gravity residuals which are obtained from DDW99 model (Dehant et al., 1999), for elastic and anelastic/non-hydrostatic cases, with the computed loads.